Social Learning Theory: Toward a Unified Approach of Pediatric Procedural Pain

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Abstract

Undermanaged procedural pain has been shown to have short and long term effects on children. While significant progress regarding empirically supported treatments has been made, theoretical bases for the development and management of procedural pain are lacking. This paper examines the role of social learning theory in our current understanding of the development, expression, and maintenance of pediatric procedural pain. Social learning theory contributes not only to our theoretical understanding of pain, but also provides insight into the mechanisms of effective treatment. Specifically, the role of self efficacy, its determinants, and the developmental issues are examined. Implications for practice and future research recommendations are discussed.
Keywords: behavioral treatment, children, pediatric, procedural pain, self-efficacy, social learning theory

Introduction

Medical, sometimes painful, procedures such as dental care, blood tests, immunizations, and others are ubiquitous experiences. In childhood, procedural pain emerges from common injections or more invasive procedures, such as IVs, that are needed to treat life-threatening illnesses, such as cancer. Pain is a social experience that emerges from both personal history and social context (Craig & Pillai Riddel, 2003). Management of procedural pain in childhood is important because children's perception of pain is influenced by their early pain experiences that can impact their future response to painful events or procedures (Blount, Piira, & Cohen, 2003; Taddio, Katz, Ilersich, & Koren, 1995). Unfortunately, despite the considerable research in the past two decades, pediatric pain is often underestimated and undertreated (Craig & Pillai Riddell) and dissemination of interventions to reduce pediatric pain continues to be lacking (Blount et al., 2003). Consequently, understanding the development and maintaining factors, as well as the interventions that assist these children is imperative.

Social learning theory is one perspective from which pediatric procedural pain can be understood. A great deal of the literature examining this model has been conducted with chronic pain patients (Levy, Langer, & Whitehead, 2007). Though some have discussed the social learning contributions to procedural pain (e.g., Chambers, Craig & Bennett, 2002), an examination of the social learning implications across the etiology and treatment of pediatric pain has not occurred. Social learning theory provides a model for understanding the development, maintenance and effective treatments of pediatric procedural pain. The goal of this paper is to examine these contributions of social learning theory to our current understanding of pediatric procedural pain.

Key Concepts from Social Learning Theory

Self-efficacy is a key mechanism for understanding pain; pain perception is mediated via perceived self-efficacy of one's ability to manage the pain (Bandura, 1997). According to Bandura (1977b; 1997), self-efficacy is the primary cognitive mechanism that facilitates action. The ability of individuals to believe in their own effectiveness determines how well they will cope with difficult situations. Bandura states "Perceived self-efficacy not only reduces anticipatory fears and inhibits but, through expectations of eventual success it affects coping efforts once they are initiated (Bandura, 1977a, p. 80)." Expectations about one's personal efficacy are based on four sources of experience including performance accomplishments, vicarious experience, verbal persuasion, and emotional arousal, each with its own valance that results from behavioral enactment. Performance accomplishments are the most reliable source of efficacy expectations. These accomplishments are the most influential because they

provide the most authentic evidence that one can succeed. Participant modeling is one mode that enhances procedural accomplishments and is one of the most influential tools for raising self-efficacy beliefs. Modeling of threatening activities or joint performance with therapists can reduce the fear of an aversive activity (Bandura, 1977a, 1977b). Of the sources of self efficacy, verbal persuasion, often enacted through suggestion or exhoration, is a weaker source of self efficacy because of its low reliance on behavioral enactment.

Procedural pain is especially amenable to a social learning perspective because of the role that anticipatory anxiety and avoidance plays in the pain and distress responses. From a social learning perspective, avoidant or distress behaviors (often seen in procedural pain) are viewed as disruptions in perceived inefficacy in coping that facilitates anticipatory anxiety and avoidant behavior (Bandura, 1986). According to this view, children avoid medical procedures or display anticipatory anxiety because they believe that they will be unable to manage difficult parts of the procedure. In contrast, dual process theory, avoidant behavior is motivated by an anxiety drive not psychological processes (Dollard & Miller, 1950 as cited in Bandura, 1997). Thus, treatment in the dual process theory would posit that controlling a child's anticipatory anxiety would extinguish the avoidant behavior. However, the relationship between anticipatory anxiety and avoidant behaviors has consistently shown to have no causal link (Bandura, 1997).

However, in considering the role of self-efficacy, an understanding of childhood procedural pain is not complete without also considering the developmental factors that impact self efficacy, distress and coping. Infants and young children do not have the capacity to fully appreciate or regulate their skills (Bandura, 1997). Perceived self-efficacy is a developmental process mediated through processes of personal agency and self-differentiation (Bandura, 1997). Therefore, in the case of procedural pain, environmental determinants, including the medical context and familial interactions, have particular significance (see Craig, Lilly, & Gilbert, 1996). Bandura's (1986) concept of reciprocal determinism provides a relevant and applicable framework. This structure involves a triadic reciprocal causation that has a transactional view of the self and society, internal personal factors, and external events. These three determinants are broken down in to personal factors, environment, and behavior and interact bidirectionally so that the determinants have the same ability to influence the other depending on the situation.

Procedural Pain: Theoretical Bases of Procedural Pain

According to Blount et al. (2003) theoretical underpinnings of pediatric procedural pain is not well understood or studied. Based on Mower's two-factor theory (see Mower, 1939), these authors posited that combined physiological and psychological aspects developed through both classical and operant conditioning: a medical procedure and subsequent pain act as the unconditioned stimulus and response, respectively. Conditioned stimuli includes the anxiety and distress that emerges either emotively or vicariously when being told of the procedure or pain. The conditioned response involves the distress, fear and anxiety that preceeds the procedure. Generalization across settings and situations can occur via classical conditioning. Negative reinforcement (escape or avoidance of from the feared situation) later maintains the behavior.

In the previous model, Blount et al. (2003) acknowledged the role of modeling and vicarious learning, and Bandura (1977b) would argue that the model could be accounted for by social learning theory, and more specifically self-efficacy beliefs. According to Bandura (1977b), avoidance behaviors are not necessarily caused by the anxiety. He believed the avoidance behavior and the distress to be two separate entities; the avoidance behavior is not necessarily maintaining the levels distress as Mower's two-factor theory would suggest. From his perspective, it is also likely that procedural distress occurs because of the likelihood that pain may occur (expectation), rather than the fact that pain does occur. He argues that it is not the outcome (e.g., pain) that has the power to cause distress, but the expectancy of the

effectiveness of behavior (expectancy of self-efficacy), which is in turn maintained by the forestalling or avoidance of the procedure (e.g. injection).

Current Models of Pain and Coping

Current models of the development and maintenance of procedural pain in children provide an expanded understanding of the context for the application of social learning theory. The first model, the Proximal-Distal Model of Children's Coping and Distress During Acute Painful Medical Procedures was developed (Varni, Waldron, & Smith, 1995). In this model, distal variables tend to be trait-like and are temporally removed from the procedure, and from a behavioral perspective become the factors that are not typically seen as factors affecting the immediate context. Examples of distal variables include temperament, age, gender, and coping style (Blount et al., 2003). In contrast, proximal variables are more state like or situational in nature, and represent the primary behaviors of interest during treatment. These behaviors are the medical environment, staff behaviors, or parental reactions in a medical procedure (Blount, Bunke, & Zaff, 2000). Additionally, proximal variables have a greater potential to be manipulated, as they may develop into conditioned stimuli that can function as antecedents and consequences of children's ability to engage in distress or coping (Blount et al., 2003).

Proximal variables, therefore, due to their ability to promote coping efficacy in children, are independent variables of focus for increasing coping behaviors (Bandura, 1997). These variables can change anticipatory anxiety because they can increase a child's coping efficacy, not their actual arousal response. For example, parent modeling of an appropriate response to pain such as attending to a story or engaging in other behaviors may help the child increase their belief that they can cope with the pain. On the other hand, since distal variables are trait constant, they can play a role in identifying patients who may be in need of training for coping efficacious techniques. Although past experience of medical procedures, age, gender, or socioeconomic status cannot be changed, these characteristics can be noted as areas for potential clinical screening (Blount et al., 2000).

A second model, the sociocommunication model of children's pain, identified by Craig, Lilley and Gilbert (1996), is directly connected to social learning theory. Craig et al. fully acknowledge the role of social factors, especially family in the experience of pain in a child. According to the model, a painful event precipitates a complex interaction among the noxious stimulus, behavioral and emotional expression of pain, parent appraisal of the event and the treatments (Craig & Pillai Riddell, 2003). Craig et al. (1996) views both the individual factors and the interactional factors as key elements of the pain behavior. However, the model further explains that while the parent and child provide the proximal environment to the pain event, the influence of family, community, and culture further complications the expression of pain.

Several aspects of these two models are consistent with the assumptions of social learning theory. First, proponents of both models of procedural pain acknowledge the role of the environment, especially the family, as factors impacting the development, expression and maintenance of pain behavior, as well as the management of pain. Secondly, proponents of both models agree that previous experience with pain stimuli impact current behavior. Finally, proponents of both models view the immediate environment of the medical setting and the role of medical staff as further social contexts for the behavior. The sociocommunication model also addresses the developmental impact on the role of the environment with children. Specifically, Craig and Pillai Riddell (2003) note that the social environment has a stronger role on the pain behaviors of younger children because of their limited coping and regulation abilities, which is consistent with the developmental process of self-efficacy. This is consistent with the description from Bandura's social learning theory (1997) of the developmental process of acquiring self-efficacy, where children rely on their parents and peers as sources of feedback. While there are several consistencies among the models and social learning theory, these generalities provide little information about the role of

self-efficacy in procedural pain. Furthermore, in contrast to social learning theory, these models do not provide recommendations for treatment, which will be discussed in more detail in the following sections.

Factors Influencing the Expression of Pain in Children

A child's pain response involves complex psychophysiciological interactions that are influenced by social factors rather than simple sensory experiences (Bandura, 1995). There is evidence that an individual's pain response is determined by both environmental and genetic explanations (Walker et al., 2006; Kreitler & Kreitler, 2007). A combination of these factors determines our individual pain response (Young, 2005). These factors will be examined from a social learning perspective to understand the interaction of various social contexts and variables.

Developmental Issues

From a social learning perspective, the emergence of self-efficacy is a developmental process; children's age impacts self-efficacy as they become more confident in their ability to self-appraise their skills and understand a procedure in context and not just its immediate outcomes (Bandura, 1997). Research on procedural pain has indicated that the age of a child can influence the presentation of their pain experience. Specifically, younger children display more distress, rate pain higher, and are less able to differentiate pain responses than their older counterparts (Goodenough et al., 1997; Rudolf, Denning & Weisz, 1995). Reports of pain tend to decrease by the age of 7 or 8 (Blount et al., 2003). Research supports the development of self-efficacy in pain management. In a study investigating the role of self-efficacy on pain tolerance among children ages 7-14, Pirra, Taplin, Goodenough, and vonBaeyer (2002) found that older children reported more feelings of self-efficacy in their ability to manage pain. Young children, due to their limited cognitive skills, may have inadequate knowledge about the capacity to engage in self-efficacious behaviors to cope with procedural pain. Furthermore, it is believed that younger children are more impacted by their environment (Blount et al., 2003). *Previous Experience*

Several lines of research support the role of a child's previous experience, or learning history, with other forms of pain as impacting pain tolerance and expression. Specifically, a child's previous experience, or learning history, with other forms of pain, indicates an increased risk for higher pain levels in future procedures or painful experiences (Ruda et al., 2000; Weisman, Bernstein, & Schecter, 2003). Furthermore, Piira et al. (2002) found that children's self-efficacy predictions were impacted by previous experience; in their study, pain tolerance was predicted by their self-efficacy regarding ability to manage pain that they had already experienced, but was not related to self-efficacy regarding a type of pain that they had not previously experienced.

While current models suggest that these "distal factors" cannot be changed (see Blount et al., 2000) , research has demonstrated that memories of a painful procedure can be modified. In a group of 50 children undergoing lumbar puncture, Chen, Zeltzer, Craske, and Katz (1999) found that an intervention and questioning designed to recall coping attempts and enhance feelings of self-efficacy resulted in decrease in anxiety and distress, that generalized to the lumbar puncture procedure. From a social learning perspective, these results highlight the role of self-efficacy in impacting behavior and has implications for the role of self-efficacy in both the management of pain and the modification of learning history.

Delineating Social and Contextual Factors in Procedural Pain

As noted earlier, self-efficacy is a developmental process and because children rely on environmental cues to obtain their individualized perception of self-efficacy, their early interactions with the environment are especially salient. However, the role of the social environment in the context of procedural pain is a complex one. Research has clearly shown that there is a relationship among child,

parent, and medical staff's behavior (Blount, Sturges, & Powers, 1990), but delineating these factors is far from complete. In this section, we discuss the current literature with regard to the social aspects of procedural pain and include the role of both parent and medical staff behavior on a child's experience of procedural pain.

Regarding the parental factors influencing the expression and management of pain, Chambers, Craig, and Bennett (2002) are among the few researchers who have explicitly investigated the role of social learning theory in procedural pain. According to Chambers et al., parents impact children's pain in one of two ways: through positive reinforcement and modeling of pain behaviors. In Chambers et al.'s study, they found a significant impact of parental behaviors among girls, but not boys (possibly due to either socialization of male behavior or congruence between mother-daughter relationships). Specifically, the randomized control study found that girls whose mothers demonstrated pain promoting behaviors reported more pain than girls whose mothers did not react in the same manner.

In addition to the reinforcement and modeling parents may provide, and consistent with Bandura's concept of reciprocal determinism (1977a), research has clearly demonstrated interaction between parent and child behavior (Blount et al., 1990). Physiological markers demonstrate that parents provide physiological and psychological pain responses to children's procedural pain (Smith, Shah, Goldman, & Taddio, 2007). Correlational studies also suggest there is a bidirectional interaction between parent and child. For example, Bernard and Cohen (2006) found correlations between parent self-reported distress and nurse's ratings of infant pain. Vervoort, Goubert, and Crobez (2009) used cold water procedure (N=64) to investigate the role of catastrophizing in both parents and children on both parent and child report of distress and pain within the child. While this study is correlational, Vervoort et al. found an interaction between level of pain and parent rating of pain. Parents of children who were high catastrophizers reported more pain in the low pain condition than parents of low catastophizers and vice versa. They also found that facial expression of child pain were not congruent with parent ratings of pain, suggesting that either parents look for some other cue or that children were not as effective in using pain behaviors to solicit support.

The impact of parent anxiety on child distress is highlighted in a number of studies. Jacobsen et al. (1990) found child distress was more related to parent state anxiety than parent trait anxiety. Similar implications may have occurred in a study by Bernard and Cohen (2006) who found that while parent self-report of anxiety was correlated with parent report of infant pain, parent self report of anxiety were negatively correlated with infant heart rate (physiological measure of distress), suggesting that there may be factors, such as pretreatment impact not captured in the immediate environment.

Several studies have investigated the communication patterns occurring among parents and their children during medical procedures. Cline, Harper, Penner, Peterson, Taub, and Albrecht (2006) identified four communication patterns occurring between parents and their children: normalizing, invalidating, supportive and distancing. Furthermore, they found that normalizing occurred more among those receiving lumbar punctures, while normalizing and distancing occurred more often when ports were being started. Invalidation was most associated with distress. Pillai, et al. (2007) investigated the reciprocal mother-child interaction, as well as cultural and community patterns with 75 mother-child pairs. Results suggested that after controlling for infant behavioral pain displays, a dismissive parenting style was associated with less facial expression of pain.

The reciprocal interaction of parent and child behavior has implications for a child's development of and consequent presentation of feelings of self-efficacy regarding their ability to manage pain. While there is little research directly measuring a child's self-efficacy regarding distress and pain management in relation to parent behavior, the increases in distress found among the aforementioned studies related to parental behavior (Chambers et al., 2002; Vervoort et al., 2009) and communication (Cline et al., 2006;

Pillai et al., 2007) suggest that it is possible that parents feelings of inefficacy are impacting their children's efficacy beliefs in managing pain as well.

Parental presence and behavior

Research indicates that despite the level of pain experienced by children during the procedure, both parents and children prefer to be together during the procedure (Blount et al., 1991; Gonzolez et al., 1989; Woodgate & Kristjanson, 1996). Studies of impact of parental presence during their child's procedure have been mixed, and there are many factors that determine the influence on a child's pain response (see Young, 2005; see Piira, Sugiura, Champion, Donnelly, & Cole, 2005). Parental behaviors that are related to lower levels of distress during procedures are commands to use coping distraction, humor, and talking about non-procedure related topic (all considered forms of distraction which will be discussed when treatment is discussed). Conversely, criticism, apologies, empathy, giving control to the child, and reassurance has been associated with increased distress behaviors in children during medical procedures (Blount et al., 1989; Manimala, Blount, & Cohen, 2000). Jacobsen, Manne, Gorfinkle, Schorr, Rapkin, and Redd (1990) found that explanations have a conditional impact on children's distress level. Specifically, parents providing explanation during procedure increased distress for children who were not initially distressed, but decreased distress for children who were initially distressed.

The concept of self-efficacy (and its sources) provide insight into why reassurance, criticism, and apologies, and for some explanation, are not helpful in reducing distress. Manimala et al. (2000) and McMurtry, McGrath, and Chambers (2006) identified possible mechanisms for explaining why reassurance may not work: warning of impending pain or positively reinforcing either distress behaviors or negative emotions. In each of these scenarios, parents are providing a form of verbal persuasion as the source of self-efficacy. If the first is correct, social learning theory would suggest that parents are providing information without providing appropriate coping skills. Manimala et al. noted that reassurance may give children a cue that their coping skills may not be adequate for the upcoming procedure. Bandura (1977b) notes that fear is often a result of skill deficits (without the belief that one can manage the challenge, anxiety ensues). In this case, by providing reassurance, parents are using verbal persuasion and possibly evoking fear (emotional arousal) as a source of reduced self-efficacy. Verbal persuasion and emotional arousal are among weaker sources of self-efficacy according to Bandura (1977b). If the latter two explanations are correct, parents are socially reinforcing and responding to either distress or negative emotions. Blount et al. (1989; 1990) identified a cycle of interaction between parent reassurance and child distress, which would be consistent with Bandura's (1977a) concept of reciprocal determinism. Both explanations are feasible from a social learning perspective and more research would need to be done to fully understand the role that reassurance, criticism, and apologies play in impacting self-efficacy.

Medical personnel's behavior

Like parent behavior, behavior by medical staff can have a significant effect on the child's distress and coping behaviors. Frank et al. (1995) found that nursing staff behavior, albeit to a lesser degree than parents, predicted coping behaviors but not distress behaviors. Cohen et al. (2002) found similar results. Sweet and McGrath (1998) noted differences in parental and staff behaviors throughout phases of the procedures. Overall, medical staff made more comments than mothers during the pre-treatment phase, significantly fewer comments during the injection, and the same amount of comments during the recovery phase. The researchers noted as in previous studies, medical staffs' behavior was negatively related to a child pain response. Conversely, maternal behavior was always positively related to a child's pain response. They also indicated that staff's behavior (coping-promoting) was a better predictor of a child's reduced pain behavior during the procedure. Cohen et al. (2002) summarized research results stating that while parents had more influence on distress, nurses tended to have more influence on coping behaviors. This research is an important piece of the social environment that

influences the child's pain response. Together, these results provide support for the interaction of medical staff and child behaviors.

Reciprocal determinism, social reinforcement, and modeling have also been seen in the relationship between parent and nurse behavior. Research suggests that nurses and parents do not have a very good idea of how to either help each other or their children but respond well to training and modeling. In a study of nurse coaching for distraction, Cohen (2002) reported that while nurses were trained to provide distractions, parents also assisted. Blount et al. (1992) found that when parents were trained to coach their children in distraction behaviors, nurses demonstrated significantly more coaching. Cohen, Bernard, McClellan & MacLaren (2005) found a correlation between nursing and parent behaviors both in terms of coping promoting and distress producing behaviors.

While it has been shown that medical staff's behavior impacts child coping (Frank et al., 1995; Sweet & McGrath, 1998) and there is an interaction between parent and nurse behaviors during procedures (Blount et al., 1992; Cohen, 2002; Cohen et al., 2005), research suggests that there is little discussion between parents and nursing staff regarding psychological management of pain (Woodgate & Kirstjanson 1996; Pirra et al., 2005; Polkki, 2002). These findings together have implication for the role of self-efficacy in both nurses and parents. While role confusion may account for some of the communication deficits between parents and nurses (see Poikki, 2002), social learning theory also provides an alternative. It is possible that nurses and parents have low self-efficacy beliefs about their own abilities to help children during painful procedures. The idea that parents and nurses may have beliefs of low self-efficacy is supported by reports that they feel helpless in these situations (Woodgate & Kristajanson, 1996).

Interventions for Procedural Pain

The previous section outlined the contributions of social learning theory to the understanding of the development and maintaining factors of anxiety and distress during procedural pain. The theory differs from previous models in that it also provides insight into how effective treatments work. Current treatments are designed to impact anxiety, distress, and pain, and to increase coping skills (Blount, Piira, Cohen, & Cheng, 2006). According to Blount et al. (2003), interventions can be divided into "preparation" and "treatment." Effective preparation is characterized by providing information, modeling, and addressing coping skills (Blount, McCormick, MacLaren, & Kain, 2008; Blount et al., 2003; Cohen & MacLaren, 2007; Jaaniste, Hayaes, & vonBaeyer, 2007; Wright, Stewart, Finley, & Buffett-Jerrott, 2007). Empirically supported treatments occurring during the procedure include cognitive behavioral treatments (Powers, 1999; Spirito & Kazak, 2006).

Preparation for Procedural Pain

Preparation for medical procedures is designed to prevent and minimize undue distress and anxiety regarding procedures and potential pain (Blount et al., 2003; Jaaniste, Hays, & von Baeyer, 2008). In addition to teaching coping skills, successful completion offer children and the families opportunities to display "mastery and empowerment" (Cohen & MacLaren, 2007), which is consistent with Bandura's (1977b) belief that perception of coping abilities decrease distress and anxiety. Research and recommendations indicate that the timing and content of these procedures are imperative for successful intervention (Blount et al., 2003; Kain & Caldwell-Andrews, 2005; Jaaniste, et al.; Wright, Stewart, Finley, & Buffett-Jarrett, 2007). Specifically, recommendations indicate that children should be provided information approximately 5-7 days prior to the intervention (see Blount, McCormich, et al.; see Kain & Caldwell-Andrews). Preparation techniques typically include some combination providing information about the procedure, modeling, and/or teaching coping strategies (Blount, McCormich, MacLaren, & Kain, 2008; Blount et al. (2003); Blount et al., 2008; Jaaniste et al., 2007). Kain et al. (2007) has developed one of the most comprehensive and literature based intervention programs for procedural

preparation to date. ADVANCE is an acronym which stands for several program components: Anxiety-reduction, Distraction, Video modeling, Adding parents, No excessive reassurance, Coaching, and Exposure/shaping. Results of a randomized controlled study of 408 children across four conditions (standard care, parent presence, midazolam, and ADVANCE) indicated that the group receiving ADVANCE had less preoperative distress, lower rates of postoperative delirium and pain medication use, and quicker discharge.

Social learning theory provides significant contributions to the components of typical programs, including information provision, modeling and coping skills and the underlying mechanisms of these programs. As the strength of sources of self-efficacy would predict (Bandura, 1977b), it appears that vicarious experience and performance accomplishments are necessary to impact distress and anxiety. While Kain et al. (2007) found that medication also reduces anxiety the outcomes were not as favorable with regard to discharge, delirium, and pain management as discussed above. Furthermore, in a overview of the history of preparation research, Wright et al. (2007) and Kain and Caldwell-Andrews (2005) indicated a realization and shift from the 1960s to the 1980s to combining information about procedures with sensory information and modeling as necessary components of preparation programs. Unfortunately, in 1997 O'Bryne et al. reported that 87% of hospital still provided tours as an intervention in preparation for surgery.

While neither information nor sensory information alone is effective, vicarious modeling provides the opportunity to both perform the behavior and experience the emotional arousal, enacting both the active and emotive aspects of self-efficacy (Bandura, 1977b). According to Blount, McCormick, MacLaren, and Kain (2008), videotaped peer modeling is effective and has been the most studied but quite impractical for most hospital settings, and doll play has not been found to be effective. While it would be unethical to provide in vivo exposure, the vicarious modeling procedures in videotaped, peer modeling would not provide the efficacy strength, or level of mastery expectation, that actually performing the task would provide.

Finally, providing coping skills is also a key element of reducing distress in social learning theory (Bandura, 1977b). Providing coping skills provides the individual with the tools to manage the behavioral challenge, or in this case, the medical procedure.

Treatment of Procedural Pain

Cognitive behavioral treatments have been clearly identified as empirically supported treatments for procedural pain (Powers, 1999; Spirito & Kazak, 2006). According to Powers, psychological intervention techniques for medical procedures can be classified into five groups: relaxation and distraction, cognitive coping strategies including imagery, videotaped modeling, behavioral rehearsal strategies (which may include modeling and role play), and reinforcement of appropriate behavior (e.g., coping, lying still). Professional (i.e., nurse, psychologist) or parent coaching was an element of each of these interventions. There is significant variability across treatment protocols for procedural pain (Blount et al., 2003); however, typical intervention protocols combine elements of each of these groups.

From a social learning perspective, multicomponent, cognitive behavioral, treatment techniques (for a review see Powers, 1999) utilize a combination of sources that impact self-efficacy, including emotive imagery procedures (emotional arousal), behavioral rehearsal (performance accomplishments), and videotaped modeling (vicarious experience). For example, Jay and colleagues (1985, 1987; 1991; 1995) used a cognitive behavioral package using distraction, breathing, emotive imagery and/or reinterpretation of the painful event. Reductions in observed and reported distress were demonstrated. However, because none of these interventions attempted to parse out necessary strategies, the relative contribution of each intervention is unknown (Powers, 1999).

Distraction

Distraction is one of the most common interventions across protocols for the treatment of procedural pain (Blount et al., 2003). Distraction methods have included developmental toys, books and bubbles (Dahlquist, Pendley, Landthrip, Jones, & Steuber, 2005; Klieber, Craft-Rosenberg, & Harper, 2001; Manimiala, Blount, & Cohen, 2000), cartoons (MacLaren & Cohen, 2005; Mason, Johnson, & Woolley, 1999), short stories (Mason et al.) and virtual reality (Nilsson, Finnstrom, Kokinsky, & Enskar, 2009). The mechanism(s) of distraction is (are) not well known (DeMore & Cohen, 2005). Physiological, cognitive, and behavioral mechanisms are possible explanations (see DeMore & Cohen). Bandura (1997) also discusses pain management and the role of distraction in pain. According to Bandura (1997) pain management occurs when attention and cognitive processes are activated. From this perspective, Bandura (1997) provides examples of children who have identified their own pain/distress coping mechanisms and further explains that these behaviors are mediated by a sense of mastery (self-efficacy); that is, pain is managed when an engrossing activity occupies the mind—perceived efficacy acts to divert attention to more engrossing activities.

Since many of the studies investigating the efficacy of distraction have compared interventions, it is possible to make more conclusions about the role of self-efficacy than in previously discussed studies, and therefore, more detail will be provided. Some research studies seem to indirectly support the view that pain management found in distraction is mediated by self-efficacy. As noted earlier, self-efficacy is impacted by its source (Bandura, 1977b). Cohen et al. (2001) found that when information was given that an intervention to decrease pain would be implemented distress and expectations of pain were not decreased. However, recall of pain was impacted by intervention. Those in the topical care anesthetic and distraction conditions recalled less anxiety and pain than those in the typical care condition. Therefore, information regarding intervention did not reduce pain, but recall of pain was reduced after they had the opportunity to experience the intervention. This is not surprising from a social learning perspective. Prior to the immunization, children did not have experience with the interventions and would not perceive it as efficacious (their perceived self-efficacy would be low). However, following the intervention, their own view of the intervention would have taken on a different quality—their self-efficacy was changed through the performance accomplishment.

Along similar lines, reassurance has been identified as distress provoking (Blount et al., 1989; Manimala et al., 2000; Sweet & McGrath, 1998). We have conceptualized reassurance as a form of verbal persuasion, with very little efficacy strength, or as a form of social reinforcement of distress behavior. In an investigation comparing distraction to reassurance, Manimala et al. found that reassurance produced more distress behavior than either typical care or control. Parent behaviors between the control and reassurance group did not differ on distraction, but parents in the reassurance group reassured more than parents in both the control and distraction groups.

In addition, Bandura (1997) would predict that the more engaging an activity, the less pain would be experienced (i.e., higher perceived self-efficacy). Results investigating the perceived level of engagement of a distractor have been mixed. Mason et al. (1999) found an interactive storybook more effective than cartoons. However, MacLaren and Cohen (2005) compared two types of distractors (interactive toy versus video) with children ages one to seven-years to determine whether the more interactive would result in decreased distress and pain. However, contrary to hypothesized, children were more distracted and demonstrated less distress with the video. However, in looking more closely at the social learning implications of these mixed results, the role of self-efficacy emerges again. According to Bandura (1997) pain is mediated by perceived self-efficacy. In each of the studies noted above, distraction devices were limited and the experimenter presumed the engaging nature. However, it is well known in psychology that reinforcers are individualized; similarly, it is likely that the role of self-efficacy and impact on attentional processes are individual as well. As one explanation, MacLaren and Cohen

noted that the toy may not have engaged the participants as expected. The need for individualized equipment and interactive distracters was highlighted via subjects' interview data in a study looking at the effectiveness of virtual reality equipment (Nillson et al., 2009).

Infant distraction

Recently, more research has emerged studying the use of distraction during immunizations with infants. Results have been mixed. Cohen (2002) investigated the role of nurse coaching of video distraction versus typical care, which may include distraction, reassurance, and explanations, among 90 infants ages 2 months to 3 years. While parents and nurses did not note differences in distress levels, behavioral observation indicated that children in the distraction condition demonstrated less distress. Cramer-Berness (2005) compared typical care, supportive care (parents were educated about immunization process and encouraged to recall and use effective soothing techniques with their infants), and distraction (light and sound toy) conditions across 123 infants' ages 2 months to 2 years. In contrast to Cohen (2002), she found no difference between supportive care and distraction; though supportive care was superior to typical care (distraction was not). More recently, Cohen et al. (2006) compared a movie distraction and typical care condition using parent and nurse coaching of infants (though nurses were not found to use distraction differentially in the two conditions) for 136 infants ages 1-21 months. Results indicated that distraction was more effective than typical care in reducing infant distress both prior to and following the immunization.

From a social learning perspective there are several issues that require consideration in the use of infant distraction. First, earlier and based on Bandura's (1997) work we hypothesized that distraction was effective among older children because of the perceived self-efficacy and its role in attention processes. However, there has been little research regarding self-efficacy in preverbal and early childhood (Bandura, 1997). According to Bandura (1997), development of self-efficacy requires the ability to recognize oneself as a separate entity. However, he further explains that children begin this process by proxy, by getting parents to respond to their needs. If this is indeed the case, then the role that parents' play is a particularly important role during infant distraction. From our earlier discussion on the social and contextual factors impacting procedural pain, we know that parents' behavior impacts infants' distress (e.g., Bernard & Cohen, 2006; Sweet & McGrath, 1998). Furthermore, it should be noted that research also suggests that infants as young as 3 months can engage in distraction to sooth and that at that age, the distracter is important (Harman, Rothbart, & Posner, 1997). Taken together, the conflicting results of Cohen (2002), Cohen et al., 2006 and Cramer-Burness (2005) are not necessarily concerning. It is possible that parents' own level of self-efficacy is impacting the results, and children's coping is experienced by proxy. In both studies, parents' self-efficacy was impacted in Cohen et al.'s (2002, 2006) studies by teaching distraction coaching techniques. Parents in Cramer-Burness' study also experienced increased self-efficacy. Recall that the supportive care group was encouraged regarding their ability to sooth their infants (their own self-efficacy was enhanced) and that there was no difference between the two conditions. Furthermore, recall that in Cohen et al.'s study, parent coaching was more pronounced than nurses coaching (supporting the role of parent behavior and efficacy). While there is certainly more research to be done, together the two groups may provide some clues as to the role of social learning theory in the use of distraction with infants.

Coaching of Distraction Behaviors

Coaching a child through the distraction process is another dynamic in the treatment of procedural pain relevant to social learning theory. Its importance has been identified in a number of studies. Blount et al. (1989) found that coaching by an adult; either parent or staff preceded coping behavior in children. Furthermore, Cohen et al. (2002) found that though children trained in distraction had learned the skill, they struggled to implement the skills. Powers (1999) found that coaching was an element in all of the treatment packages that were empirically supported.

From a social learning perspective, coaching can be viewed as either social reinforcement for a behavior or verbal persuasion. The impact of parent coaching on child distress and pain ratings has been mixed. Klieber, Craft-Rosenberg, and Harper (2001) found that although children in the coaching condition used significantly more distraction, child ratings of pain and distress were not different than those found among children in the control condition. However, there was a trend toward decreased distress behaviors across the procedure compared to the children in the control group. Cohen, Blount, and Panopoulos (1997) compared a nurse coach to nurse coach plus parent and child training. Results showed no difference between the two coaching conditions, but both were superior to standard care. These results provide important information that may be informed by a social learning perspective. Developmentally, children may have low self-efficacy beliefs, which seems to impact their desire to use the skills that they already have (Cohen et al., 2002). Second, results demonstrate that either parent or nurse/staff coaching provides the necessary cues to prompt use of appropriate coping skills. A longitudinal study, addressing whether children used the skills during later procedures may be helpful in determining the role of self-efficacy for children.

Summary

In summary, social learning theory provides information about the possible mechanisms for decreased anxiety and distress during medical procedures. According to Powers (1999), cognitive behavioral therapy provides effective treatment for procedural pain. Among the effective components identified, modeling, behavioral rehearsal, and relaxation are modes of enhancing self-efficacy (Bandura, 1977b). Distraction has also been viewed as a technique that has been linked to feelings of self-efficacy (Bandura, 1997). Coaching, which is commonly combined with distraction or other treatments, is hypothesized to enhance self-efficacy by providing necessary cues to enhance personal self-efficacy but this is an area that needs further exploration.

Discussion

Pain is a social phenomena (Craig & Pillai Riddell, 2003). Social learning theory has several implications for the current state of our understanding of the etiology and treatment of pediatric procedural pain. While this has been acknowledged in the past (e.g., Bates, 1987; Chambers, Craig & Bennett, 2002), little work has been done to explore pediatric procedural pain from this perspective. The goal of the current article was to explore these relationships in light of our current understanding of pediatric procedural pain.

Social learning contributes to the current understanding of pediatric procedural pain on a number of levels. Theoretically, it is well accepted within the field that a child's distress and anxiety, as well as management, evolves from a variety of sources. While a modification of the behavioral explanation modification of Mower's two-factor model has been proposed (Blount et al., 2003), Bandura's (1977b) concept of self-efficacy provides an alternative explanation for distress and avoidant behavior often observed among individuals undergoing painful procedures. In contrast to current models (Blount et al., 2003), Bandura (1977b) would argue that distress is not maintaining the avoidant behavior, but that the expectation of pain and the lack of appropriate coping skills (low self-efficacy to manage pain) maintains the behaviors. From his perspective, then, Bandura (1977b) believes that treatment should intervene at the level of coping skills and subsequent efficacy for managing the perceived threat.

In addition to providing an alternative theoretical model, social learning theory provides a more unified approach to addressing social and contextual factors impacting distress and pain among children. That is, while the current models (The Proximal-Distal Model of Children's Coping and Distress During Acute Painful Medical Procedures (Blount, Bunke, & Zaff, 2000; Varni, Waldron, & Smith, 1995; Blount et al., 2003) and the sociocommunication model (Craig et al., 1996; Craig & Pillai Riddell, 2003) provide necessary but descriptive information about factors affecting a child's level of distress and pain, social

learning theory provides specific implications regarding both the development of procedural anxiety and which interventions are most helpful in promoting self-efficacy.

While self-efficacy has not been studied extensively among children undergoing medical procedures, current research results and recommendations provide indirect support for the role of self-efficacy in procedural pain on several levels. First, a number of the interventions used stem directly from social learning theory. Multicomponent treatment packages are currently the common treatments for both preparation of procedural pain (Blount et al., 2008; Kain et al., 2007; Young, 2005) and intervention during painful procedures (Powers, 1999; Spirito & Kazak, 2006). In both preparation and intervention, techniques such as behavioral rehearsal and vicarious modeling which have moderate strength in terms of efficacy sources (Bandura, 1977) are common. Second, while self-efficacy has not been directly investigated, research seems to indirectly support Bandura's (1977b; 1997) predictions. For example, studies using lower sources of self-efficacy, such as information or suggestions, found that ratings of pain and distress were not decreased (e.g., Chen et al., 1999; Cohen et al., 2001). Finally, research suggests that self-efficacy ratings regarding pain are developmental (Piira et al., 2002).

Recommendations for Future Research

The current review provided information about the role that social learning theory could provide to our current understanding of the development and management of procedural pain. However, few of the premises have been directly studied. Research will need to more closely investigate the role of self-efficacy on children's pain and distress. Specifically, research could investigate the development of self-efficacy with regard to pain management in children, by further investigating both parents' and staff member's own levels of self-efficacy. Prospective studies could provide additional information about the role of the family environment in the development of self-efficacy. For example, at the birth of their children, parents could be asked about their own feelings of self-efficacy, levels of anxiety, etc. that relate to anxiety and distress in children. Further understanding of the role that both coaching and reassurance play in impacting self-efficacy is warranted. Finally, studies that look more directly at the role of self-efficacy within the treatment setting are also recommended.

Current research suggests that procedural pain occurs within a context: both proximal and distal. One area that is relevant to social learning theory and has been grossly neglected in the study of procedural pain is multicultural issues. While Cohen et al. (2001) and Barrera (2000) investigated interventions with minority children, there have been few studies that have looked at the relevant cultural factors in procedural pain. Pillai Riddell et al. (2007) investigated the relative impact of community and cultural factors on infant pain behavior. They found that two stressors, maternal psychopathology and low identification with mainstream culture, significantly influenced (positive correlation) maternal pain recall on day one following immunization. Our understanding of socially mediated pain experiences is especially salient given our changing demographic composition (see Shreshtha, 2006)

Implications for Practice

Social learning theory has implications for a number of areas. First, given that interventions that provide vicarious experiences and performance accomplishments provide opportunities to strengthen self-efficacy (Bandura, 1977b), intervention programs should attempt to incorporate the highest level (source) possible. Research regarding preparation programs has already demonstrated that information alone is not sufficient (see Kain and Caldwell-Andrews, 2005; see Wright et al., 2007). However, it has already been noted by Blount et al. (2008) that video taped modeling is one of the most studied but least practical in hospital settings. Researchers should be encouraged to further investigate effective but practical means of generating self-efficacy among children, parents, and staff.

Another area that has been discussed in the literature on procedural pain is who is best to provide assistance to children during procedures. Several studies have found nurse coaching to be viable (e.g., Cohen, 2002; Cohen et al.; 2002) and others (e.g,. Dahlquist et al. 2002; Klieber et al., 2001) recommend parent training. Several authors have highlighted the cost issue and demonstrated that nurse training is the most cost effective (e.g., Cohen & MacLaren, 2007; Cohen et al., 1999). However, if conceptualizing from a social learning theory perspective, the implications may be broader. If the underlying mechanism is self-efficacy and feelings of self-efficacy are initiated within the family environment (Bandura, 1997), then the broader implication is the impact that these types of interactions (i.e., modeling of distress, low self-efficacy) have on the child's self-efficacy in the long run. While parent training may be time consuming and costly, providing parents with information prior to immunizations may be helpful, and research suggests that parents want and need more information (Piira et al., 2005; Woodgate & Kristjanson, 1996). For example, parents are given information about the medical aspects of immunizations. Information about assisting in child coping could be added to that material.

Conclusion

In conclusion, social learning theory provides a conceptual model for our current understanding of the development, maintenance and treatment of procedural pain. While the social aspects of pain are clear (Craig et al., 1996; Craig & Pillai Riddell, 2003), research has not directly investigated many of the tenets of social learning theory with procedural pain. It is the hope of the authors that with this dialogue additional research will emerge demonstrating that social learning theory provides a unified approach to our understanding of pediatric procedural pain.

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